

# PATENT SPECIFICATION

**770,615**



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## COMPLETE SPECIFICATION

### Improvements in or relating to Centrifugal Strainer Separators.

We, THE WESTERN STATES MACHINE COMPANY, a corporation of the State of Utah, United States of America, having a place of business at Hamilton, County of Butler, and State of Ohio, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to centrifuges and particularly to those employed for separating liquids from solids, such as those used in the separation of syrup from crystallized sugar, in which separation is brought about in a rotatable basket, and the solids so separated are then cleaned with washing fluid delivered through a sprayer, before finally being discharged by a discharge mechanism.

In one type of such a centrifuge, both the sprayer and the discharge mechanism are normally operated in sequence by an automatic timer which may also control the initial charging of the basket with unseparated material, the separating operation itself and an operation whereby the washed solids are dried. When the timer controls all these five operations, the centrifuge should produce, in different cycles, separated solids of a uniform quality. Similarly even when only the spraying and discharging operations are controlled by the timer, solids having a uniform quality should be produced provided that the charging operation, the separating operation and—where it occurs—the drying operation, are suitably and accurately controlled.

However, in practice, such a uniform product has not been obtained hitherto because of unpredictable variations in the pressure of the washing fluid used for washing the charge in the rotating basket. When the pressure of this fluid drops below a predetermined value there is an attendant reduction in the amount of fluid applied to the charge during the period or periods of washing for which the automatic

timer is set, and an inferior product is consequently obtained. This condition has been quite troublesome and a source of considerable losses in practice, for it is difficult if not impossible to maintain the continuous watch that would be necessary in order to observe drops of pressure in the washing fluid supply at the time of their occurrence.

According to the present invention, fall of the pressure of washing fluid passing to the sprayer actuates an electric switch in a circuit of the automatic timer to prevent the discharge mechanism from operating if the fluid pressure has fallen below the pre-determined value during the spraying operation. Thus cessation of the normal operation of the machine gives notice of the failure of the pressure of the washing fluid supply and of the necessity for correcting this faulty pressure condition.

One example of a centrifuge constructed according to the invention will now be described with reference to the accompanying drawings in which:—

Fig. 1 is a plan, partly broken away and partly in section, of the main part of the centrifuge;

Fig. 2 is a side elevation, partly broken away, looking in the direction of the arrows 2—2 of Fig. 1;

Fig. 3 is a further side elevation, partly broken away, looking in the direction of the arrows 3—3 of Fig. 1, and showing part of the fluid supply system;

Fig. 4 is a fragmental cross-section looking in the direction of the arrows 4—4 of Fig. 1;

Fig. 5 is a fragmental cross-section looking in the direction of the arrows 5—5 of Fig. 1; and

Fig. 6 is a wiring diagram illustrating certain co-acting elements of the actuating and timing circuits of the centrifuge and their functional electrical connections.

Figures 1, 2 and 3 show a centrifuge for separating liquids from solids and for washing the solids after this separation, and may be of

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the type described in Specification Nos. 688,707 and 688,712.

The present centrifuge includes a cylindrical stationary curb 10 having a centrally open top 11, the opening being closable by a two-part closure 12. A perforate basket 13 is coaxially suspended within the curb 10 from the bottom of a vertical driving spindle 14 by which the basket is rotated. Means such as that disclosed in the aforesaid specifications are provided for suspending and reversably rotating the driving spindle 14. Thus, a batch of liquid-bearing solids, such as sugar and syrup, is placed within the basket 13, which is then rotated to expel the liquid by centrifugal force through the perforations in the basket and into the curb 10 beyond the basket.

A shoe 15 is positioned in the perforate basket 13 for ploughing away, during the basket discharging operation, solid material which adheres to the inside of the basket wall. The shoe is carried upon a vertical shaft 16 within the basket and is held away from the basket wall at the top of the basket (see Figs. 1 and 2) during the centrifugal liquid separation and the washing operations, but is turned towards the basket wall to plough away solid material adhering thereto, and is moved vertically for this purpose, during the discharging operation. The construction and arrangement of the discharger may be of any suitable type, one especially desirable construction being disclosed in detail in the aforesaid Specifications.

Means are provided for washing the liquid-purged solid material in the basket. In the present embodiment, such means comprises a washing fluid or wash water pipe 17 having spray nozzles 18 thereon for directing a washing spray upon the solid particles adhering to the vertical wall of the basket, from which the liquid has been substantially purged by centrifugal action during rotation of the basket. Hereinafter, the washing fluid will be referred to as wash water, although other fluids may be employed for the washing operations. The wash water pipe 17 is connected, through a fitting 19 and a train of pipes 20, to a wash water control valve 21 which controls the flow of wash water after a wash water shut-off hand valve 22 has been opened. The wash water control valve 21 is governed by compressed air, connected thereto by a tube 23, regulated by a wash water solenoid valve WWSV, as shown in Fig. 3.

Apparatus is also provided for washing from the shoe 15 any solid material which may have adhered thereto during its ploughing action. To this end, a pipe 24 extends from a T-section 25 connected in the train of pipes 20 upstream from the fitting 19, and projects through the top of the basket 13. A nozzle 26 at the end of the pipe 24 is positioned near the top of the basket to direct a spray of wash water against the shoe when at rest and to wash adhering material from it during the

spraying phase of the cycle of operation.

Connected to the train of pipes 20 by a T-section 27 and a tube 28 is an electric wash water pressure switch PSW which is responsive to the wash water supply pressure. The T-section 27 is on the upstream side of both the T-section 25 and the fitting 19, and the pressure switch PSW is therefore responsive to the full wash water pressure. Set to act should the wash water pressure drop below a predetermined standard the wash water pressure switch PSW is electrically connected to other control elements of the centrifuge to prevent discharge of the contents of the basket and continued operation of the centrifuge after the basket has been brought to rest at the end of the process period of the cycle in which the washing fluid fell below standard. Non-discharge of the contents of the basket and stopping of the centrifuge at the end of the process period gives notice of wash water pressure failure. The attendant then inspects the charge in the basket of the centrifuge and decides whether to accept and add it to the bulk of finished product or to bring it up to the desired quality by further treatment.

Operation of the centrifuge up to the end of the breaking phase takes place in the manner usual in sugar centrifuges, for example, in the manner described in the aforesaid Specification. Should the wash water pressure fail, however, the wash water pressure switch acts in the manner described above. Such action will be more particularly described in connection with the wiring diagram shown in the 100 drawing.

The basic circuits controlling operation of the centrifuge may be substantially of the character disclosed in the aforesaid Specification. Fig. 6 of the drawing shows, diagrammatically, enough of the automatic control of the machine to illustrate how the wash water pressure switch PSW governs operation of the centrifuge. As the operation of the centrifuge reaches its washing phase, contacts PT4 of the automatic electric process timer close, energizing the wash water solenoid valve WWSV and opening the wash water control valve 21, in the manner and with the results already described. At the end of the washing phase, the process timer (not shown) opens the contacts PT4 and the wash water solenoid valve WWSV closes the wash water control valve 21 to terminate the washing operation. If the wash water pressure has not fallen below standard during the washing phase, the contact PSW1 of the pressure switch PSW remains closed.

As the centrifuge is brought to rest in the braking period of the cycle, the contacts PT5 are closed by the process timer. When the speed of the decelerating basket approaches zero, the normally open contacts ZS1 of a zero speed switch (not shown) are closed, thereby energizing a relay R. When the relay R is 130

energized its contacts R1 are closed, thereby energizing a discharge timer DT and causing the centrifuge to proceed automatically into the discharging phase of its cycle. With the contact PSW1 of the wash water pressure switch PSW closed, the sequence just described is effected automatically and the contents of the basket are discharged.

On the other hand, should the wash water pressure have fallen below standard during the washing phase of the cycle, the contact PSW1 of the wash water pressure switch PSW opens and remains open. Normal energization of the discharge timer DT and starting of the discharging phase of the cycle cannot then be effected. Instead, the basket and its contents remain at rest.

What we claim is:—

1. A centrifuge having a rotatable basket for separating liquids from solids, wherein a sprayer for spraying washing fluid onto contents of the basket and a discharge mechanism are normally operated in sequence by an automatic timer and wherein fall of the pressure of washing fluid passing to the sprayer actuates an electric switch in a circuit of the automatic timer to prevent the discharge mechanism from operating if the fluid pressure

has fallen below a predetermined value during the spraying operation.

2. A centrifuge according to claim 1, wherein the washing fluid controlling the switch passes to it through a junction provided in a pipe between the sprayer and a valve which controls the flow of fluid to the sprayer, this valve being controlled by a solenoid valve controlled by the automatic timer.

3. A centrifuge according to either claim 1 or claim 2, in which the discharge mechanism includes a discharger shoe movable between a rest position and a position in which it operates, as the basket rotates, to scrape away contents of the basket for discharging, the shoe in its rest position being cleaned, during the spraying of contents of the basket, by a second sprayer supplied with fluid the flow of which is controlled by the timer.

4. A centrifuge according to claim 1, constructed and operating substantially as described with reference to Figures 3 and 6 of the accompanying drawings.

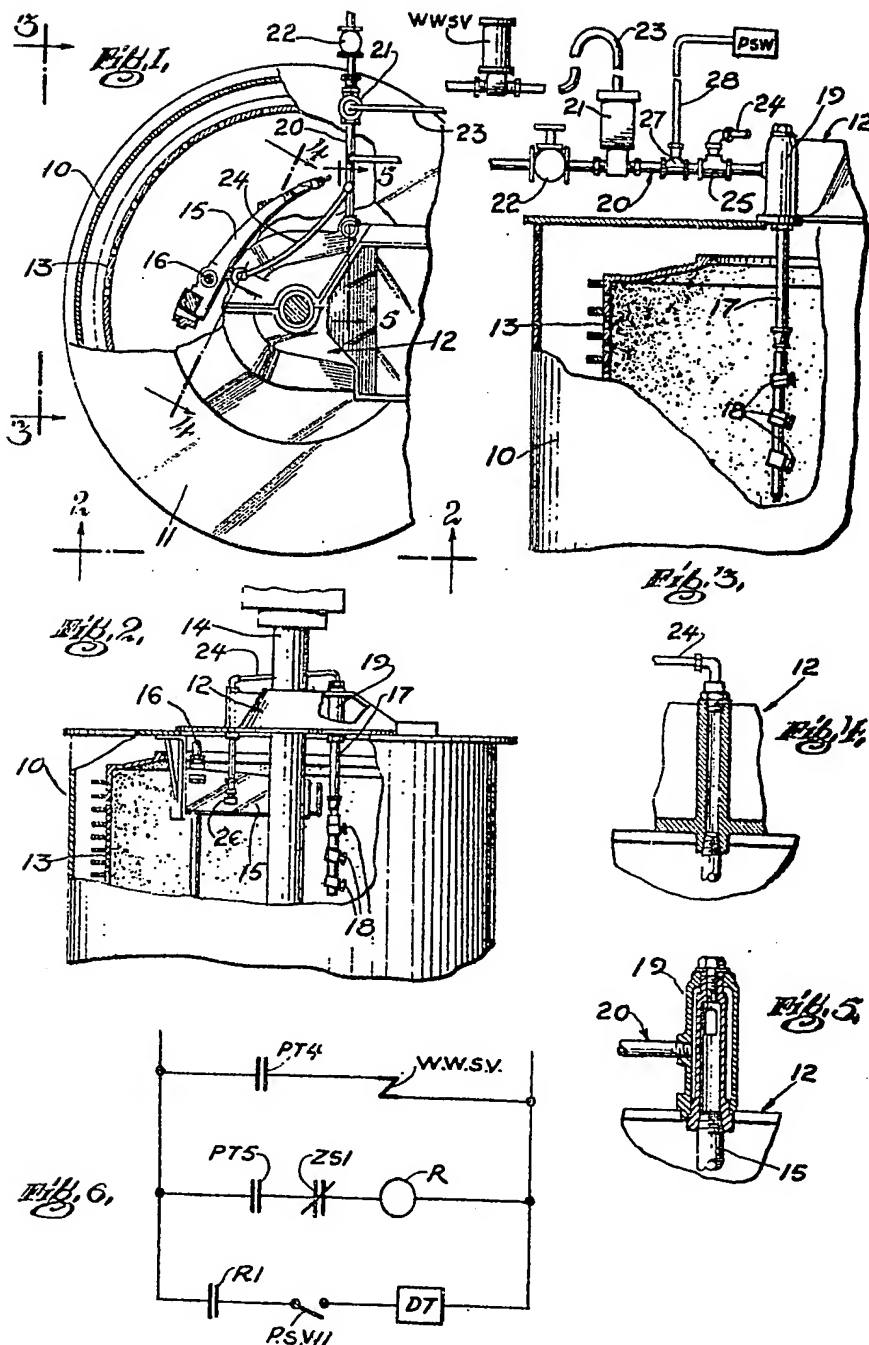
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